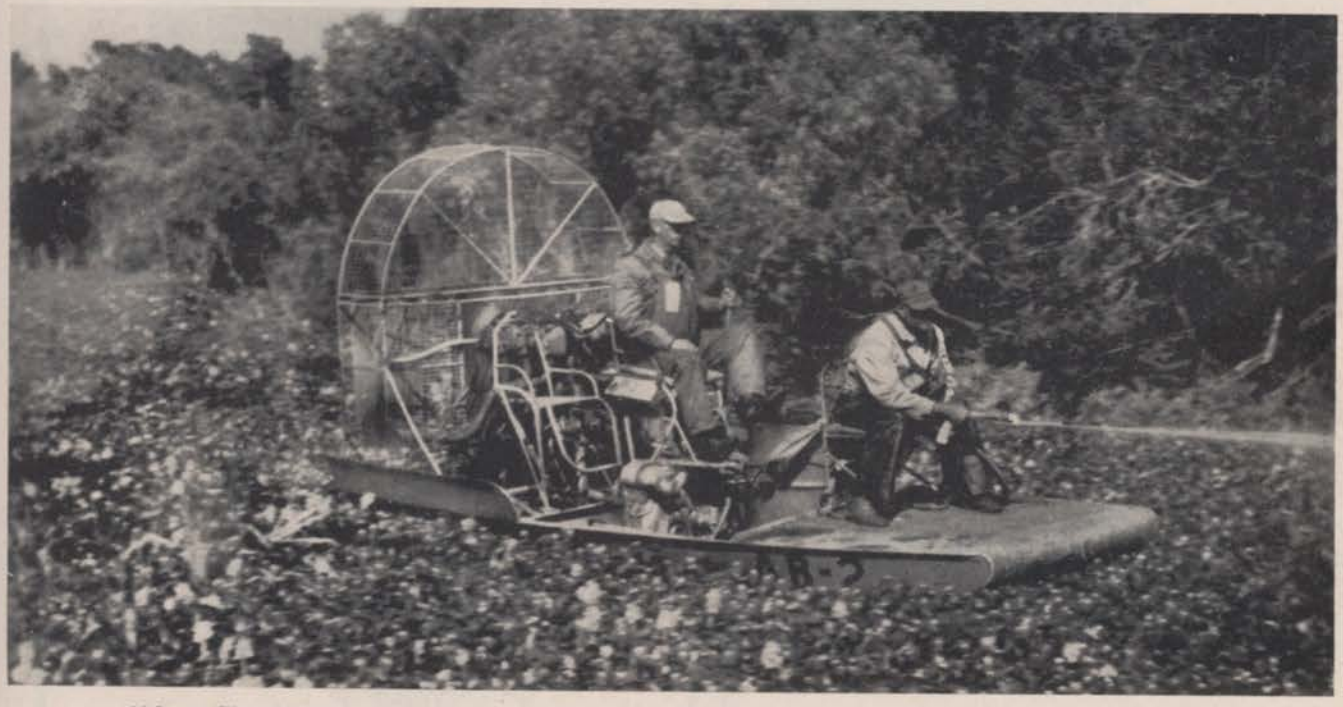
WEEDS and TURF

DECEMBER 1963

Monthly news for contract sprayers of weeds, turf, ornamentals, and trees



Airboats like this skim easily over weed-infested waters. Photo courtesy U. S. Army Engineer District, Jacksonville, Fla.

Equipment for Aquatic Weed Control

Page W-4

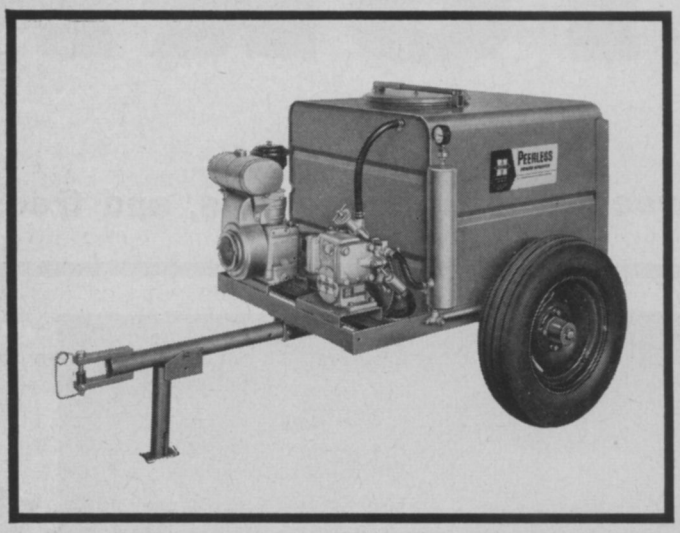
Conference News . . .
NE Weed Control . . W-16
Int'l Turf-Grass . . W-17
Arborists Assn. . . W-18

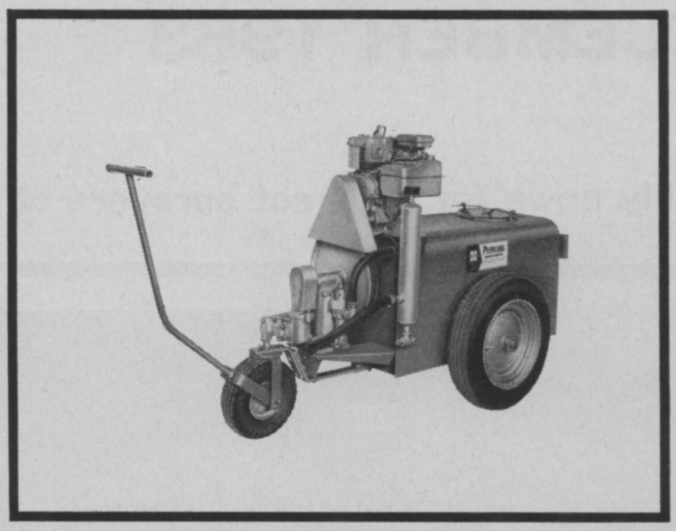
Florida Spraymen Don't Fear Antipesticide Talk . . . W-12

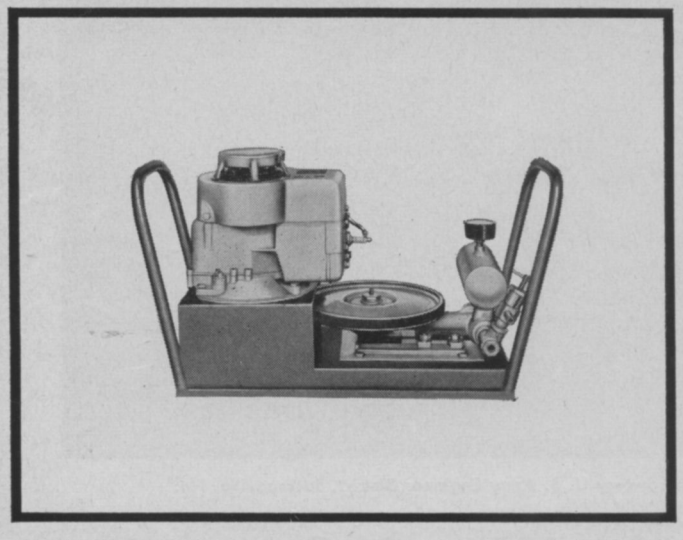
Reach more pest control markets with these **HUDSON** power sprayers

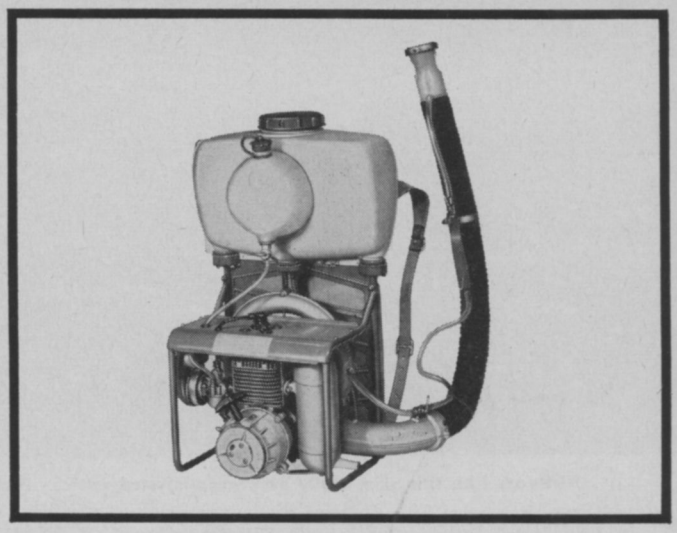
Peerless power sprayer cuts time-wasting stops for service and repairs. New Ten-O-Matic® pump has no gears, no sliding pistons, no connecting rods, no packing, no cups—almost nothing to wear, break or chip. Handles any sprayable materials at pump capacities up to 10 gallons per minute; pressures to 400 pounds. Available in 150, 200, and 300-gallon tanks with either stainless steel or Endurall® bonded liners.

Peerless compact power sprayer handles any sprayable materials with pressures up to 400 pounds and at five gallons per minute output. Compact size and three wheel design provides exceptional maneuverability; easy to move by hand into places other high output sprayers cannot go. Two-wheel and skid models in 50, 100, 150, and 200-gallon tanks with either stainless steel or Endurall® bonded liners. Also Matador,® 15 to 100 gals.









Porta-power spray pump combines high output performance with unrestricted range in a moderately priced unit. Carry it on your pick-up truck; take it in a boat. Pump from barrels, tanks, or any other type of container. Positive piston pump handles all sprayable materials. Porta-power pumps are available in models with outputs of five gallons per minute at 400 pounds or three gallons per minute at 250 pounds.

Schefenacker power mist sprayer goes wherever you can walk or crawl; lets you penetrate areas inaccessible to any other type of power sprayer. Weighs only 32 lbs. (empty). Adjustable straps and padded, ventilated back make Schefenacker comfortable and easy to carry. Operating controls are in front at your fingertips. Two models: one for mist spraying only; the other for mist spraying, dusting, and wet dusting.

Be sure to see these Hudson power sprayers, plus our hand-operated sprayers and dusters at the National Pest Control Association Convention, Booth No. 5. Or, if you can't make the show, write to us for complete product information.

SIGN OF THE BEST BUY

HUDSON®

©1963 H.D.H. Mfg. Co.

H. D. HUDSON MANUFACTURING COMPANY
589 E. Illinois St., Chicago, Illinois, U.S.A., 60611

Is this half of your sales force missing?

If you or your men sell weed, turf, or tree care, you need all the latest tips you can find . . . and you'll find them each month in *Weeds and Turf*. For your own personal copy, subscribe now: $3 one year; $5 for two.

WEEDS AND TURF
1900 Euclid Avenue
Cleveland, Ohio 44115
Yes—I want to receive *Weeds and Turf* each month
for one year ☐ two years ☐

Name .....
Address .....
City ..... State .....
Check enclosed ☐

WEEDS and TURF
PEST CONTROL
A SECTION OF PEST CONTROL MAGAZINE

December, 1963

Features

Applicator's Manual of Aquatic Weed Control, Part III: Equipment, Techniques, and Ecological Problems W-4

Weeds and Turf's 1963 Index of Articles W-8

Antipesticide Atmosphere Won't Stop Progress for Florida Spraymen, HSAF '63 Convention Implies .. W-12

NWCC Moves to Hotel Astor for 1964's Varied Program W-16

See Record Crowds for 35th International Turf-Grass Conference Feb. 9-14 .... W-17

Departments

Know Your Species W-16
Meeting Dates W-17
Trimmings W-18

Published Monthly by
TRADE MAGAZINES, INC.
1900 Euclid Avenue
Cleveland, Ohio 44115

•

JAMES A. NELSON
Publisher

CHARLES D. WEBB
Editor

DAVID E. SCHNEIDER
Staff Biologist

R. J. HOFFER
Circulation Manager

•

Advertising Representatives
National Headquarters
1900 Euclid Avenue
Cleveland, Ohio 44115
Phone: Area Code: 216+771-4169

New York City
Billingslea & Ficke
420 Lexington Avenue
Phone: Area Code: 212+
LExington 2-3667

•

Single Copies: 35 cents
Annual Rate for
12 Monthly Issues: $3.00

Well . . . not this year

A mere glance at the list of technical conferences in vegetation management which are in the offing in the next few months (see Meeting Dates, p. W-17) reveals that contract applicators have unparalleled opportunities for self-improvement all around them.

This impressive catalog of conferences includes first-rate seminars on turfgrass management, weed control (including aquatic), and tree care. How many CAs are missing out on this invaluable training because they "can't take time out" to spend sitting in the lecture hall, or traveling to the meeting site?

No doubt we're all very busy these days. Sales development, personnel training, and the endless details of business management which every CA faces, eat up the hours relentlessly.

But it may be false economy to forego a day or two in the conference halls, where the leading scientific minds in the vegetation field are assembled.

None of us should ever stop trying to learn. And in a year in which the competence of pesticide applicators has received such close scrutiny, it is more imperative than ever to get out and listen to what the experts have to say.

In most cases, fees for the conferences are notably reasonable, frequently less than $10, a small price to pay for knowledge!

We hope that industrymen, when they read over the calendar of events in this issue, will not just nod agreement that the opportunities to learn are excellent, only to add, "Well . . . not this year."

Many observers note that 1964 may well be *the* year which can alter the course of the pesticide industry. Now is the time to make an extra effort to pick up a notebook, and file into the conference rooms with an eager and anticipatory mind.

Contents of this Issue © Trade Magazines, Inc., 1963

Simple boats can be pressed into service on aquatic jobs, frequently with great success. (photo courtesy Ortho Div., California Chemical Co.)

Applicator's Manual of Aquatic Weed Control, Part III

Equipment, Techniques, and Ecological Problems

Results of another *Weeds and Turf* research project

TYPES of application equipment used in aquatic weed control probably vary more than in any terrestrial weed work. Operators may choose very inexpensive outfits for occasional jobs, or very costly systems for constant work.

In many cases, aquatic spray systems are homemade; few companies manufacture a complete rig especially designed for water weed contracts. Applicators purchase pumps, nozzles, hose, etc., and mount these on airboats, barges, and other craft. Some self-designed systems are highly complex and efficient.

To lay the groundwork for adapting spray equipment to water craft, we shall review briefly the various types of chemicals used in aquatic weed control and how they can be applied.

Liquids may be sprayed from a small hand-powered sprayer, from a truck, or from a boat. (Suitable boats will be described later.) Liquids may be poured in concentrated form directly into water from a moving boat. Although some dilution is achieved by diffusion in water, even distribution is minimized with this simple technique.

Liquids which may be irritating to eyes or nose are often dispensed with as little handling as possible. These types are injected into water through tubes which extend below the surface.

Granular preparations may be dispersed by hand, but this method is the least dependable from the standpoint of even distribution. Whirling disc seeder-spreaders make efficient machines to broadcast granules. These may be powered manually or by a motor.

Beginning with the simplest method of application, disregarding applications on foot (or with a hand-pump sprayer), consider the rowboat, skiff, or johnboat. These can be used where granular applications are made either by hand or by a seeder-spreader. These broad-bottomed boats remain relatively stable when loaded with a supply of chemicals. Nonrecreational-type boats, when fitted with a small motor (10 horsepower or less), will serve to apply either granules or spray to ponds and small lakes. Limited carrying capacity makes small boats uneconomical for lakes where refilling stops are necessary.

Some operators have sufficiently large rowboats on which they can mount their pump, motor, tank or drum, and spray boom or gun for easy liquid application.

Since plenty of water is available on lake jobs, many operators with small craft use a screened suction hose to pump water from the lake and concentrated chemical from a drum, mixing the two in the hose and spraying via boom or gun.

This system requires a constant pressure pump since there is no mixing tank and there can be no backflow hose. Gasoline engines generally used range around 4 horsepower. Pumps supply up to 10 gals. per minute with variable pressures. Working pressures are low, and vary from 50 to 100 lbs. per sq. in. High pressure is not needed because the spray target for boom work is not distant. Pressures used should be the lowest possible which will allow complete and even coverage. Higher pressures (up to 200 psi.) may be required for spray nozzle treatment of expanses of

floating mats or marginal weeds. Drums full of concentrate are not usually carried upright in a small craft because of questionable stability. Instead, they are laid in the boat on their sides. By tapping the "bung" on the sides, the suction tubes fit in neatly. On small custom boats, mixing tanks may be built in, extending from beam to beam. These may be either steel or lightweight fiberglas. This arrangement gives added stability. Baffles inside sizeable tanks are suggested to help keep an "even keel." When separate tanks or drums are used for mixing, a second pump is required to do the tank-filling operation while the dispensing pump is active. However, a constant pressure pump is not necessary if a mixing tank with an agitator is used, because there can then be a backflow, or overflow, hose to relieve excess pressures.

Chemical is actually discharged either through a boom or with a spray gun. With a suitable valve arrangement, the change from boom to gun application is easy. An orchard gun or a ⅜-inch fire nozzle is usually chosen for manual spraying. Larger nozzle openings reduce chance for drift. A boom can be a 1-inch galvanized pipe mounted on angle iron at the stern. Holes ⅜-inch dia. are drilled 1 ft. apart so that spray streams will hit water at an angle. This also reduces drift.

Doubled Boats Serve as Barge

An adaptation of small craft for more extensive jobs is seen in the double-hulled platform. By strapping two rowboats together and firmly mounting a platform of marine plywood above them, a barge of sorts results. This platform will carry increased weight and gives workmen room to move about if necessary. Aluminum boats give additional buoyancy and increased portability because of their light weight. A 25-hp. outboard motor will propel the double hull at sufficient applicating speeds.

It is a short step from double rowboats to a barge. Operators get increased buoyancy and carrying capacity although maneuverability is somewhat lessened when a barge is used. With proper rigging, a barge makes an efficient spray platform. Large steel barges 25 ft. long by 8 ft. wide can carry several tons of material if necessary, and are easily propelled by a 40- to 50-hp. outboard motor. Large areas can be treated with no stops for refills. Larger swaths can be treated at one time and total working time is reduced.

Variations of propulsion can be made on many small craft. A few applicators have made successful advances with airdrive boats, those driven by airplane engines and custom propellers which are safely enclosed in a guard. Mounted on a shallow-draft vessel, these propellers can drive a boat over floating or emersed weeds with no danger of fouling motors, as with outboards. Maneuverability is increased in that airboats can stop, turn, and reverse direction in less distance than outboards. Airboats are capable of running right up to the shore because of their shallow draft. They can even ride over wet mud when the water level has been lowered. Airboats can be equipped to apply any form of chemical; booms can be utilized to gain increased coverage per swath with liquid applications.

Large-scale operators have taken to the air and find helicopters highly economical for aerial applications of chemicals, either liquid or granular preparations. The extremely maneuverable helicopter is not handicapped by aquatic or terrestrial barriers and large areas can be treated in a very short time. The chemical is carried in tanks attached saddle-fashion to either side of the helicopter. Gravity normally feeds herbicide granules into an electrically or hydraulically driven whirling broadcaster. Liquid applications are pumped into a boom for distribution. Swaths from 50 to 120 feet may be utilized depending upon the height of application, the quantity of flow, and the type of herbicide used. Although initial cost is relatively high compared to watercraft, faster control over much larger areas is achieved and total costs are less. This is especially true when the timing of application is essential for control.

Monoplanes and biplanes are also used for fast application of liquid herbicides to canals and inland waterways. Fixed-wing aircraft, however, need runways for take-off and landing, and if airports are not near treatment area, valuable time may be lost refilling.

Even distribution of chemicals is part of the key to successful operations. Uneven distribution of herbicides may leave untreated areas which can contribute to reinfestation. Uneven distribution can also lead to insufficient application to areas so that aquatic plants are damaged but not killed. The plants recover as if the herbicide had no effect.

On the other end of the scale, uneven distribution may cause overdose in a particular area and fish-kill may result, leaving a dissatisfied customer.

Even distribution is the most important point to consider when actually applying the chemical. Other considerations, such as timing and dosage (reviewed in the second installment last month) are determined beforehand.

To be certain of even distribution several factors must be evaluated; these factors must remain constant while herbicides are applied.

Chemical concentration must be correlated with the pump and nozzle capacity. These two factors, combined with the operating speed of the applicating craft, determine, in the end, the final concentration of the chemical in the treated water.

Much of this calibrating can be done beforehand also. To determine just how fast a sprayer does work, pumps can be run with water only from a tank of known capacity. After a given amount of time, refill the tank to see how much water has been pumped out. This is the pump delivery for the amount of time the machine has run, usually stated in gallons per minute (gpm).

Determining concentration of herbicides delivered from the pump is not as important when using the double-suction device which utilizes lake water. The concentration which is important is the end concentration of the herbicide in the water body itself or on the foliage of floating or emersed plants. The amount of water used to carry the herbicide is important only in that it helps the operator get better overall distribution, when boom injecting or, coverage, when spraying foli-

This concludes the three-part series of articles on aquatic weed control which was initiated in October. Prepared by the *Weeds and Turf* Staff Biologist, David E. Schneider, the manuscript was reviewed by leading consultants with suppliers and universities, including several experiment stations. We gratefully acknowledge this help.

age. Recommendations are usually stated in so many gallons or pounds of active herbicide per acre or per acre-foot of water. This remains constant no matter how much water is used to deliver the herbicide.

Pros Use Ecology

Ecology is the study of an organism, plant or animal, in relation to its environment. When we consider the ecology of aquatic weeds and how control is affected by environment, some interesting problems arise. First fact to be noted is that water is the environment for many plants and animals, just as air is the environment for man. Dropping chemicals into the water environment can be like dropping a bomb into man's habitat. The control chemicals must be selective for specific weeds and the operator must know how to use these chemicals in a selective manner (see installment II).

When chemicals are applied for control of floating weeds, it must be remembered that the presence of these surface plants has an effect on other weeds nearby. Some submersed species are suppressed by the shade of floating leaves. If attempts are not made to determine what kind of weeds may underlie floating species, and what will be needed to control them, one infestation may simply be substituted for another.

No job can be undertaken when one knows only the dominant species in the area. Other suppressed species should be sought out and identified so that their control can be taken into consideration.

Ecologic significance can also be attached to animals which inhabit water bodies when weed control measures are applied. Although a chemical may be proved to be entirely nontoxic to fish, these and other aquatic animals may be killed indirectly when the decaying vegetation, which uses up much of the available oxygen, depletes the oxygen supply in a lake. Rapid-acting herbicides should be applied in alternate swaths over a period of time so that fish may escape the oxygen-poor areas. This method is commonly called "partial treatment."

Fish Need Some Weeds

Another complication is the fact that some fish feed on insects and their aquatic larvae; these insects harbor in and among the aquatic vegetation and in the bottom soil. A client cannot order removal of all of these weeds (to improve fishing) and still expect the fish population to survive in complete absence of their natural insect food supply. Again partial treatment over a longer period of time, a year or more, will keep from starving all the desirable fish. Even with a more complete treatment a follow-up application of fish food will encourage fish survival and growth.

There may be times when substituting one plant for another is advisable. In this case, the applicator should know what weeds are suited to the client's needs. He may suggest removal of an old crop and seeding a new, less objectionable weed to maintain natural conditions. For instance, in a waterfowl lake, it may be desirable to destroy shallow-water submersed weeds and foster growth of emersed plants, such as *Peltandra* sp., seeds of which are a known food for water birds. It could also be desirable to foster growth of erect reedy species which afford shelter for ducks (and hunters).

Plan to Use Weeds

One very interesting idea that has been cited by expert weed controllers is the use of some emersed aquatic weeds as natural barriers or lane markers. Attempts to remove all weeds (even one species) are impractical and unwise (if not impossible). Therefore, why not make the best use of a controlled crop of weeds, these operators suggest.

On some lakes where there are multiple activities (swimming, boating, water skiing, duck hunting, fishing, and skin diving), and weedy conditions are right, it is possible to maintain some traffic control and keep all of these factions happy. This is done through the planned control of weeds in specific areas, leaving some crops of weeds to act as barriers so that water skiers do not invade the area designated for swimmers or fishermen, and vice versa.

This program, of course, is not short term, but requires much planning and will result in a long-term contract with the client to maintain control as the barriers begin to expand during the second and third year.

It is not really too difficult to assess the needs of each group which uses a lake. Swimmers generally want completely weed-free waters so that divers do not get entangled in submersed weeds. Fishermen need a certain amount of growth to shelter fish but not the submersed types which foul propellers and snag fishhooks. Water skiers want generally clear, open water. Duck hunters in the fall will be able to take over the whole lake but will want some emersed weed stalks in which to build their blinds and some weedy food plants to attract the migrating flocks to their lake.

Try for Compromise

Scientists will admit that many of nature's complexities still elude them. Imbalances in nature often occur when man misuses resources; sometimes imbalances occur for no apparent reason. In light of human error, scientists attempt to study nature and solve problems by reaching a compromise of "nature's scheme" and man's desire to utilize resources.

The job of a professional weed controller is not simply to do what the customer says he wants done. Rather, he should appraise the situation and advise (in light of the customer's desires) what approach would be best for his needs according to how he wishes to use the water.

Applicators thus become knowledgeable consultants able to do the control work when required, but also able to show customers what should be done and why.

A body of water used for recreational or esthetic purposes is useless if it is nearly sterile. What the professional applicator wishes to do is to halt or confine the biological succession of flora which would eventually turn the lake into a swamp and finally back to dry land.

Consult with Client

Decisions on which stage of development to maintain in a lake or pond rest with the applicator (and in some states with government officials who must be consulted and who supervise operations). When all factors are considered—degree of infestation and species involved, desired future use of the water, and other animals dependent upon the body of water and their desirability in that particular body—only then can the operator decide upon an approach and agree with the client about a price for the job.

One can see that aquatic weed control is not a service to be entered into lightly. Thorough study of weeds and control chemicals is needed to be competitive. Preparations must be extensive, and risks are high. But the complexity of the challenge is surpassed by the po-

(Continued on page W-11)

Double-Duty Herbicide: New ORTHO® Diquat

Kills aquatic weeds like nothing you've ever seen and Diquat is also a terrific non-selective control for weeds around buildings, along fences, ditch banks and roadways.

Quick, and easy to use . . .

Diquat is completely water soluble so that a bare minimum of agitation is all that's required. Because there is no oil residue left behind, cleaning of equipment is greatly reduced. Diquat is absorbed by weeds like a sponge. In a matter of hours weeds collapse and die. (The label directions will tell you how much and when to use.)

Many advantages used as directed . . .

It doesn't build up in water. It is inactivated immediately on contact with soil. Diquat being water soluble eliminates constant citizen complaint of offensive weed oil odors. Diquat is non flammable and non explosive, so it materially reduces fire hazard along highway right-of-ways. Be sure to follow the label directions.

Surprisingly economical . . .

With all these advantages, Diquat is economical, too. That's because it's highly concentrated. A little goes a long way. In fact, five gallons of Diquat will control up to 20 acres of weeds. By comparison it would take up to 2000 gallons of weed oil.

"Helping the World Grow Better"

CALIFORNIA CHEMICAL COMPANY, ORTHO DIVISION, 200 Bush St., San Francisco 20, California

ON ALL CHEMICALS, READ CAUTIONS AND DIRECTIONS BEFORE USE.

T.M. REG. U.S. PAT. OFF.: ORTHO, HELPING THE WORLD GROW BETTER

Weeds and Turf's 1963

Index of Articles

An alphabetical reference to subjects and titles of all major feature articles, feature columns, news stories, letters published in *Weeds and Turf* in 1963. A list of authors of this year's articles follows the Directory on page W-10.

KEY

(f) feature article (ns) news story (c) feature column (ed) editorial (L) letter (br) book review

Issue Pg.

A

(Acidity) A Basic Guide to Turfgrass Fertilization, by Dr. D. P. Satchell (f) ..... Apr W-9
(Aerial Application) Aquatic Weed Control Manual, III (f) ..... Dec W-5
(Airboats) Aquatic Weed Control Society Meeting Report (nf) ..... Apr W-16
(Airdrive Boats) Aquatic Weed Control Manual, III (f) ..... Dec W-5
(Algae) Aquatic Weed Control Manual, I (f) ..... Oct W-16
(Anthracnose) How to Recognize and Control Major Shade Tree Pests, by Franklin R. Hall (f) ..... Aug W-13
(Aphids) How to Control Pests of Ornamentals, by Dr. Donald L. Schuder (f) ..... Jul W-8
(Aphids) How to Recognize and Control Major Shade Tree Pests, by Franklin R. Hall (f) ..... Aug W-9
Aquatic Weed Control, Applicator's Manual of (f)
Biology and Identification of Aquatic Weeds, I ..... Oct W-8
Chemicals for the Control of Aquatic Weeds, II ..... Nov W-4
Equipment and Techniques for the Control of Aquatic Weeds, III ..... Dec W-4
(Aquatic Weed Control) Southern Weed Conference Report (nf) ..... Mar W-16
Aquatic Weed Control Surveyed at 15th Illinois Spray School, Turf and (nf) ..... Apr W-22
Aquatic Weed Society Meeting Told, Ecology Is Keynote to Successful Waterweed Control, Delegates to 3rd (nf) ..... Apr W-14
(Armyworms) How to Identify and Control Insect Pests in Turf, II (f) ..... Mar W-14
(Arsenic Compounds) Soil Sterilization for Weed Control (f) ..... Mar W-11
(Ash Dieback) International Shade Tree Conference Report (nf) ..... Sep W-13

B

(Bagworm) How to Control Pests of Ornamentals, by Dr. Donald L. Schuder (f) ..... Jul W-10
(Beetle Grub Control) How to Identify and Control Insect Pests in Turf, I (f) ..... Feb W-10
(Beetles, Bark) How to Recognize and Control Major Shade Tree Pests, by Franklin R. Hall (f) ..... Aug W-13
(Beetles, Leaf) How to Control Pests of Ornamentals, by Dr. Donald L. Schuder (f) ..... Jul W-10
(Billbugs) How to Identify and Control Insect Pests in Turf, I (f) ..... Feb W-14
Bindweed, Field, Know Your Species (c) ..... Jul W-18
(Blister Beetles) How to Control Pests of Ornamentals, by Dr. Donald L. Schuder (f) ..... Jul W-10
(Boats) Aquatic Weed Control Manual III (f) ..... Dec W-5
(Borers) How to Control Pests of Ornamentals, by Dr. Donald L. Schuder (f) ..... Jul W-12
(Borers) How to Recognize and Control Major Shade Tree Pests, by Franklin R. Hall (f) ..... Aug W-10
(Boron Compounds) Soil Sterilization for Weed Control (f) ..... Mar W-11
Broadleaf Plantain, Know Your Species (c) ..... Apr W-29
(Brush Control) California Weed Conference Report, by Vincent H. Schweers (nf) ..... Mar W-22
(Brush Control) Railway Weed Control Survey (f) ..... Jun W-6
Buckhorn Plantain, Know Your Species (c) ..... Apr W-29

C

(Cacodylic Acid) Business Opportunities in Turf Reseeding, by Dr. Robert W. Schery (f) ..... Sep W-7
California Weedmen Focus on Application at 15th Annual Conference in Santa Barbara, by Vincent H. Schweers (nf) ..... Mar W-20
Canada Thistle, Know Your Species (c) ..... May W-28
(Cankerworms) How to Recognize and Control Major Shade Tree Pests, by Franklin R. Hall (f) ..... Aug W-9
(Caterpillars) How to Recognize and Control Major Shade Tree Pests, by Franklin R. Hall (f) ..... Aug W-11
(Caterpillars, Leaf-feeding) How to Control Pests of Ornamentals, by Dr. Donald L. Schuder (f) ..... Jul W-10
Chemicals for the Control of Aquatic Weeds, Applicator's Manual of Aquatic Weed Control, II (f) ..... Nov W-4
Chemicals, Guide to Suppliers of Weed and Turf (f) ..... Oct W-18
(Chinch Bugs) How to Identify and Control Insect Pests in Turf, II (f) ..... Mar W-15
Chinch Bugs, How to Identify and Control (f) ..... May W-16
(Chinch Bugs) Sevin Insecticide, New Carbamate for Turf, Trees, and Ornamentals, by Dr. J. B. Harry (f) ..... Aug W-17

Issue Pg.

(Cicada Control) Sevin Insecticide: New Carbamate for Turf, Trees, and Ornamentals, by Dr. J. B. Harry (f) ..... Aug W-17
(Cicada Killer) How to Identify and Control Insect Pests in Turf, II (f) ..... Mar W-26
Cress, Hoary, Know Your Species (c) ..... Aug W-18

D

Dacamine, Combines Safety of Amines, Punch of Esters, New Herbicide, by Drs. R. J. Marrese and B. A. Sprayberry (f) ..... Jan W-19
Dandelion, Know Your Species (c) ..... Sep W-14
(Disease, Dutch Elm) How to Recognize and Control Major Shade Tree Pests, by Franklin R. Hall (f) ..... Aug W-13
(Dormant Cane Broadcast) Railway Survey Report (f) Jun W-6
Drift!, Beware of the Hazards of Spray Mist, by Frank L. Wilson (f) ..... Jan W-12
Dutch Elm Disease: Cause, Precautions (f) ..... May W-12
(Dutch Elm Disease) International Shade Tree Conference Report (nf) ..... Sep W-11

E

(Elm Bark Beetles) Dutch Elm Disease: Cause, Precautions (f) ..... May W-12
Equipment and Techniques for Control of Aquatic Weeds, Applicator's Manual of Aquatic Weed Control, II (f) ..... Dec W-4
(Equipment) Aquatic Weed Control Society Meeting Report (nf) ..... Apr W-15
(Equipment) How We Built A Whole Fleet of Lawn Spray Trucks, by Larry Nipp (f) ..... May W-10
(Equipment, Protective) Handy USDA Guide to Respirators Shows Spraymen Which Mask to Use on the Job (f) ..... Jan W-16

F

Fertilization, A Basic Guide to Turfgrass, by Dr. D. P. Satchell (f) ..... Apr W-8
Field Bindweed, Know Your Species (c) ..... Jul W-18
Florida Turf Show, Improved Management Techniques Stressed at 2nd, by Walter D. Anderson (nf) ..... Jul W-16
Fumigate Soil for Turf Weed Control, How to, by Fred W. Fletcher (f) ..... Feb W-8
Fumigation, Turf Diseases, 34th International Turf-Grass Show Draws 1300; Delegates Study Soil (nf) ..... Apr W-18
(Fungi) How to Recognize and Control Major Shade Tree Pests, by Franklin R. Hall (f) ..... Aug W-14
Fungicide, Panogen Turf, by Dr. Margareta Lambert (f) ..... Apr W-12
(Fungicide) International Turf-Grass Conference Report (nf) ..... Apr W-18

G

(Galls) How to Control Pests of Ornamentals, by Dr. Donald L. Schuder (f) ..... Jul W-13
Ground Ivy, Know Your Species (c) ..... Mar W-29
(Grubs) How to Recognize and Control Major Shade Tree Pests, by Franklin R. Hall (f) ..... Aug W-10
Guide to Suppliers of Weed and Turf Chemicals (f) ..... Oct W-18

H

(Helicopter) Aquatic Weed Control Manual, III (f) ..... Dec W-5
Herbicide, Dacamine, Combines Safety of Amines, Punch of Esters, New, by Drs. R. J. Marrese and B. A. Sprayberry (f) ..... Jan W-19
Highway Study Shows Wide Use of Custom Sprayers (f) ..... Jan W-10
Hoary Cress, Know Your Species (c) ..... Aug W-18

I

Illinois Spray School, Turf and Aquatic Weed Control Surveyed at 15th (nf) ..... Apr W-22
Insect Pests in Turf, How to Identify and Control, I (f) ..... Feb W-10
Insect Pests in Turf, How to Identify and Control, II (f) ..... Mar W-14
(Insurance) Florida Turfgrass Conference Report, by Walter D. Anderson (nf) ..... Jul W-16
International Shade Tree Conference in Toronto, Seek Replacements for Dying Markets, Treemen Urge at 39th (nf) ..... Sep W-10
Ivy, Ground, Know Your Species (c) ..... Mar W-29

J

Johnsongrass, Know Your Species (c) ..... Jan W-29

K

Knapweed, Russian, Know Your Species (c) ..... Jun W-16

L

(Lawn Renovation) Business Opportunities in Turf Reseeding, by Dr. Robert W. Schery (f) ..... Sep W-6
Lawn Spray Trucks, How We Built a Whole Fleet of, by Larry Nipp (f) ..... May W-10
(Leafhoppers) How to Control Pests of Ornamentals, by Dr. Donald L. Schuder (f) ..... Jul W-9
(Leafminers) How to Recognize and Control Major Shade Tree Pests, by Franklin R. Hall (f) ..... Aug W-12
(Leaf-rollers) How to Control Pests of Ornamentals, by Dr. Donald L. Schuder (f) ..... Jul W-12
(Leaf-tyers) How to Control Pests of Ornamentals, by Dr. Donald L. Schuder (f) ..... Jul W-12

M

(Maple Decline) International Shade Tree Conference Report (nf) ..... Sep W-13
Mask to Use on the Job, Handy Guide to Respirators Shows Spraymen Which (f) ..... Jan W-16
(Mealybugs) How to Control Pests of Ornamentals, by Dr. Donald L. Schuder (f) ..... Jul W-10
(Mildew, Powdery) How to Recognize and Control Major Shade Tree Pests, by Franklin R. Hall (f) ..... Aug W-14

You can now kill brush on a year 'round basis

The key: Dormant Cane Broadcast — Scientists' concepts of chemical brush killing used to be that woody plants could not be effectively controlled with winter-month application. Diamond, however, sponsored research on this unique application method of brush control with the use of six-pound acid equivalent Line Rider formulations. The results speak for themselves:

• Materials needed reduced • Application time in hours per acre reduced • Kill effectiveness increased • Effective spray season lengthened • Hazard of crop damage eliminated • Unsightly brown-out eliminated.

Diamond's experience and specific formulation techniques with dormant cane broadcast can be of help to you. For details on dormant cane broadcast or six-pound Line Rider products, write Diamond Alkali Company, 300 Union Commerce Building, Cleveland, Ohio 44114.

Diamond Chemicals

Issue Pg.
Mist Drift!, Beware of the Hazards of Spray, by Frank L. Wilson (f) ....Jan W-12
(Mite, Bermudagrass) How to Identify and Control Insect Pests in Turf, II (f) ....Mar W-26
(Mites, Clover) How to Identify and Control Insect Pests in Turf, II (f) ....Mar W-15
(Mites) How to Control Pests of Ornamentals, by Dr. Donald L. Schuder (f) ....Jul W-14
(Mites) How to Recognize and Control Major Shade Tree Pests, by Franklin R. Hall (f) ....Aug W-9
(Mole Crickets) How to Identify and Control Insect Pests in Turf, II (f) ....Mar W-26
(Moth, Gypsy) How to Recognize and Control Major Shade Tree Pests, by Franklin R. Hall (f) ....Aug W-10
(Moth, Lawn) How to Recognize and Control Insect Pests in Turf, I (f) ....Feb W-16
(Moth, Lawn) How to Identify and Control Insect Pests in Turf, II (f) ....Mar W-14

N

(Nomenclature, Industry) What's a CA? (ed) ....May W-5
(Nonselective Weed Control) Soil Sterilization for Weed Control (f) ....Mar W-10
Northeast Weed Conference Decides, Science No Longer Divorced from Public, 17th (nf) ....Feb W-20
(Nozzles) Beware of the Hazards of Spray Mist Drift!, by Frank L. Wilson (f) ....Jan W-12
(Nozzles) Southern Weed Control Conference Report (nf) ....Mar W-18
Nursery, Ornamental Spraying Contracts, How to Get More, by Dr. Robert Snetsinger (f) ....Jun W-8
(Nutrients, Soil) A Basic Guide to Turf Fertilization, by Dr. D. P. Satchell (f) ....Apr W-9

O

Ornamentals, 535 at '63 Wooster Field Day Updated on Lawns, (nf) ....Nov W-12
Ornamentals, How to Control Pests of, by Dr. Donald L. Schuder (f) ....Jul W-8
Ornamentals, Sevin Insecticide: New Carbamate for Turf, Trees, and, by Dr. J. B. Harry (f) ....Aug W-16
Ornamental Spraying Contracts, How to Get More Nursery, by Dr. Robert Snetsinger (f) ....Jun W-8

P

Panogen Turf Fungicide, by Dr. Margareta Lambert (f) ....Apr W-12
Pesticide Use Investigators, Freeman Explains Federal Law to (ns) ....Jul W-21
(pH) A Basic Guide to Turfgrass Fertilization, by Dr. D. P. Satchell (f) ....Apr W-9
(Phenoxy Herbicides) New Herbicide, Dacamine, Combines Safety of Amines, Punch of Esters, by Drs. R. J. Marrese and B. A. Sprayberry (f) ....Jan W-19
Plantain, Broadleaf, Know Your Species (c) ....Apr W-24
Plantain, Buckhorn, Know Your Species (c) ....Apr W-24
(Pressure Gauges) Beware of the Hazards of Spray Mist Drift!, by Frank L. Wilson (f) ....Jan W-12
(Price-cutting) Don't Buy Business (ed) ....Sep W-5
(Pricing, Job) How Much Does It Cost? (ed) ....Aug W-5
(Propeller Airdrive) Aquatic Weed Control Manual, III (f) ....Dec W-5
(Public Relations) Ambassadors All! (ed) ....Apr W-5
(Pumps) Aquatic Weed Control Manual, III (f) ....Dec W-5
(Pumps) How We Built A Whole Fleet of Lawn Spray Trucks, by Larry Nipp (f) ....May W-10

R

Raceway Job Draws Harder to Weed Control (f) ....Feb W-18
(Railroad Weed Control) Southern Weed Control Conference Report (nf) ....Mar W-18
(Railroad Weed Control) Sterilize Soil from Air (ns) ....Jan W-24
Railway Weed Control Jobs, Survey Shows Contractors Get Nearly Half of (f) ....Jun W-6
(Research) What Do You Need To Know? (ed) ....Jun W-5
(Resistance) How to Identify and Control Chinch Bugs (f) ....May W-22
Respirators Shows Spraymen Which Mask to Use on the Job, Handy USDA Guide to (f) ....Jan W-16
(Right-of-Way Weed Control) Railroad Survey Report (f) ....Jun W-6
Russian Knapweed, Know Your Species (c) ....Jun W-16

S

(Safety) Be Cautious Near Power Lines (ns) ....Jul W-15
(Safety) Handy USDA Guide to Respirators Shows Spraymen Which Mask to Use on the Job (f) ....Jan W-16
Sago Pondweed, Know Your Species (c) ....Nov W-11
(Sawflies) How to Control Pests of Ornamentals, by Dr. Donald L. Schuder (f) ....Jul W-12
(Sawfly) How to Recognize and Control Major Shade Tree Pests, by Franklin R. Hall (f) ....Aug W-12
(Scale Control) N. C. Entomologist Recommends Precautions for Dormant Oils (ns) ....Nov W-13
(Scale Insects) How to Control Pests of Ornamentals, by Dr. Donald L. Schuder (f) ....Jul W-9
(Scale Insects) How to Recognize and Control Major Shade Tree Pests, by Franklin R. Hall (f) ....Aug W-12
(Seeding) Business Opportunities in Turf Reseeding by Dr. Robert W. Schery (f) ....Sep W-6
Sevin Insecticide: New Carbamate for Turf, Trees, and Ornamentals, by Dr. J. B. Harry (f) ....Aug W-16
Shade Tree Conference in Toronto, Seek Replacements for Dying Markets, Treemen Urge at 39th International (nf) ....Sep W-10
Shade Tree Conference Laments Severe Winter and Hot Dry Summer, Ohio (ns) ....Aug W-20
Shade Tree Pests, How to Recognize and Control Major, by Franklin R. Hall (f) ....Aug W-8
(Sodium Chlorate) Soil Sterilization for Weed Control (f) ....Mar W-11
(Sod Webworm Control) How to Identify and Control Insect Pests in Turf, I (f) ....Feb W-14
Soil Sterilization for Weed Control (f) ....Mar W-10
(Soil Sterilization) How to Fumigate Soil for Turf Weed Control, by Fred W. Fletcher (f) ....Feb W-9

Issue Pg.
(Soil Sterilization) Tritac: New Weapon for Weed Control, by L. S. Whitcomb (f) ....May W-14
"Southern Weed Conference Proves Industry Growth," Holstun Tells Weedmen Gathered in Mobile, Jan. 16-18, "Record Attendance at 16th" (nf) ....Mar W-16
Sterilization for Weed Control, Soil (f) ....Mar W-10
Sterilize Soil From Air (ns) ....Jan W-24
(Submersed Weeds) Aquatic Weed Control Manual, I (f) ....Oct W-11
(Sweetgum Blight) International Shade Tree Conference Report (nf) ....Sep W-14

T

(Tanks) Aquatic Weed Control Manual, III (f) ....Dec W-5
(Tanks) How We Built A Whole Fleet of Lawn Spray Trucks, by Larry Nipp (f) ....May W-10
(Thatch Removal) Business Opportunities in Turf Reseeding, by Dr. Robert W. Schery (f) ....Sep W-7
Thistle, Canada, Know Your Species (c) ....May W-28
(Timing of Controls) Aquatic Weed Control Manual, II (f) ....Nov W-4
Treemen Urge at 39th International Shade Tree Conference in Toronto, Seek Replacements for Dying Markets (nf) ....Sep W-10
Tree Pests, How to Recognize and Control Major Shade, by Franklin R. Hall (f) ....Aug W-8
Trees, and Ornamentals, Sevin Insecticide: New Carbamate for Turf, by Dr. J. B. Harry (f) ....Aug W-16
(Triazine compounds) Soil Sterilization for Weed Control (f) ....Mar W-30
(Tritac) Hooker Has New Herbicide (ns) ....Mar W-25
Tritac: New Weapon for Weed Control, by L. S. Whitcomb (f) ....May W-14
Turf and Aquatic Weed Control Surveyed at 15th Illinois Spray School (nf) ....Apr W-22
Turf Chemicals, Guide to Suppliers of Weed and (f) ....Oct W-18
Turfgrass Fertilization, A Basic Guide to, by Dr. D. P. Satchell (f) ....Apr W-8
Turf Reseeding, Business Opportunities in, by Dr. Robert W. Schery (f) ....Sep W-6
Turf, Trees, and Ornamentals, Sevin Insecticide: New Carbamate for, by Dr. J. B. Harry (f) ....Aug W-16
Turf Weed Control, How to Fumigate Soil for, by Fred W. Fletcher (f) ....Feb W-8
Turf-Grass Show Draws 1300; Delegates Study Soil Fumigation, Turf Diseases, 34th International (nf) ....Apr W-18
(2,4-D Compounds) Soil Sterilization for Weed Control (f) ....Mar W-12

U

(Urea Compounds) Soil Sterilization for Weed Control (f) ....Mar W-12
USDA Guide to Respirators Shows Spraymen Which Mask to Use on the Job, Handy (f) ....Jan W-16

V

(Vegetation Decay) Aquatic Weed Control Manual, II (f) ....Nov W-4
(V-C 13) How to Identify and Control Chinch Bugs (f) ....May W-22

W

(Watercraft) Aquatic Weed Control Manual, III (f) ....Dec W5
Waterweed Control, Delegates to 3rd Aquatic Weed Society Meeting Told, Ecology is Keynote to Successful (nf) ....Apr W-14
Weed and Turf Chemicals, Guide to Suppliers of (f) ....Oct W-18
Weed Control, How to Fumigate Soil for Turf, by Fred W. Fletcher (f) ....Feb W-8
Weed Control, Tritac: New Weapon for, by L. S. Whitcomb (f) ....May W-14
(Winterseeding) Business Opportunities in Turf Reseeding, by Dr. Robert W. Schery (f) ....Sep W-7
(Wireworm Control) How to Identify and Control Insect Pests in Turf, I (f) ....Feb W-14
Woodsorrel, Yellow, Know Your Species (c) ....Feb W-29
Wooster Field Day Updated on Lawns, Ornamentals, 535 at '63 (ns) ....Nov W-12

X Y Z

Yellow Woodsorrel, Know Your Species (c) ....Feb W-29

AUTHOR INDEX

Anderson, Walter D., "Improved Management Techniques Stressed at 2nd Fla. Turf Show" ....Jul W-16
Fletcher, Fred W., "How to Fumigate Soil for Turf Weed Control" ....Feb W- 8
Hall, Franklin R., "How to Recognize and Control Major Shade Tree Pests" ....Aug W- 8
Harry, Dr. J. B., "Sevin Insecticide: New Carbamate for Turf, Trees, and Ornamentals" ....Aug W-16
Lambert, Dr. Margareta, "Panogen Turf Fungicide" ....Apr W-12
Marrese, Dr. R. J., "New Herbicide, Dacamine, Combines Safety of Amines, Punch of Esters" ....Jan W-19
Nipp, Larry, "How We Built a Whole Fleet of Lawn Spray Trucks" ....May W-10
Satchell, Dr. D. P., "A Basic Guide to Turfgrass Fertilization" ....Mar W- 8
Schery, Dr. Robert W., "Business Opportunities in Turf Reseeding" ....Sep W- 6
Schuder, Dr. Donald L., "How to Control Pests of Ornamentals" ....Jul W- 8
Schweers, Vincent H., "California Weedmen Focus on Application at 15th Annual Conference in Santa Barbara" ....Mar W-20
Snetsinger, Dr. Robert, "How to Get More Nursery, Ornamental Spraying Contracts" ....Jun W- 8
Sprayberry, Dr. B. A., "New Herbicide, Dacamine, Combines Safety of Amines, Punch of Esters" ....Jan W-19
Whitcomb, L. S., "Tritac: New Weapon for Weed Control" ....May W-14
Wilson, Frank L., "Beware of the Hazards of Spray Mist Drift!" ....Jan W-12

Aquatic Weed Control

(from page W-6)

tential in financial return, and successful aquatic weed controllers find that their services are indispensable and continually called for by those who love, use, and thrive on water resources.

Bibliography

Barkeley, E. A. J., 1962, The Biological Effects of Sodium Arsenite, Proceedings of the Second Annual Aquatic Weed Control Society, Chicago, Ill.

Bennett, G. W., 1962, Management of Artificial Lakes and Ponds, Reinhold Publishers Corp., New York, N. Y., p. 171.

Crafts, A. S., 1961, The Chemistry and Mode of Action of Herbicides, Interscience Publishers, New York, N. Y., p. 150.

Crafts, A. S. and W. W. Robbins, 1962, Weed Control, McGraw-Hill Book Company, New York, N. Y., pp. 590-606.

Dupree, H. K., 1958, Weed Society of America Abstracts, pp. 54-55.

Fassett, N. C., 1960, A Manual of Aquatic Plants, revised by E. C. Ogden, University of Wisconsin Press, Madison, 405 pp.

Gaylor, J. and A. Houser, 1962, Three Years' Results with Silvex for Aquatic Plant Control in Oklahoma, Down to Earth, Vol. 18, No. 3, pp. 2-4.

Hall, T. F., 1961, Principles of Aquatic Plant Control, Advances in Pest Control Research, Vol. IV, edited by R. L. Metcalf, Interscience Publishers, New York, N.Y., pp. 211-247.

Hiltibran, R. C., 1961, The Chemical Control of Some Aquatic Weeds, June; 1962, Jan., Supplement No. 1; 1963, Jan., Supplement No. 2, revised, Illinois Natural History Survey, Section of Aquatic Biology, Urbana, Illinois.

Klingman, G. C., 1961, Weed Control: As a Science, John Wiley & Sons, Inc., New York, N.Y., pp. 321-347.

Mackenthun, K. M., 1958, The Chemical Control of Aquatic Nuisances, Committee on Water Pollution, Madison, Wisconsin, 64 pp.

Mackenthun, K. M., 1960, What You Should Know about Algae Control, Public Works, Vol. 19:9, pp. 114-117.

Maresse, R. J. and B. A. Sprayberry, 1963, New Herbicide, Dacamine, Combines Safety of Amines, Punch of Esters, Weeds and Turf, January, p. W-19.

Muenscher, W. C., 1944, Aquatic Plants of the United States, Comstock Publishing Company, Inc., Cornell Univ., Ithaca, N. Y., 374 pp.

Odum, E. P. and H. T. Odum, 1959, Fundamentals of Ecology, 2nd Edition, W. B. Saunders Company, Philadelphia, Pa., pp. 291-327.

Public Health Reports (U. S.), 1946, U. S. P. H. S. Drinking Water Standards, 61, No. 11, pp. 371-384.

Report of the Terminology Committee of the Weed Society of America, 1962, Weeds, Vol. 10, No. 3, July, pp. 255-271.

Reed, L. R., 1963, Review of Sodium Arsenite in Aquatic Weed Control, Supplement to the Proceedings of the Third Annual Aquatic Weed Control Society, Chicago, Ill.

Steenis, J. H. and V. D. Stotts, 1961, Progress Report on Control of Eurasian Watermilfoil in Chesapeake Bay, Proceedings of The Northeastern Weed Control Conference, Vol. 16, p. 566.

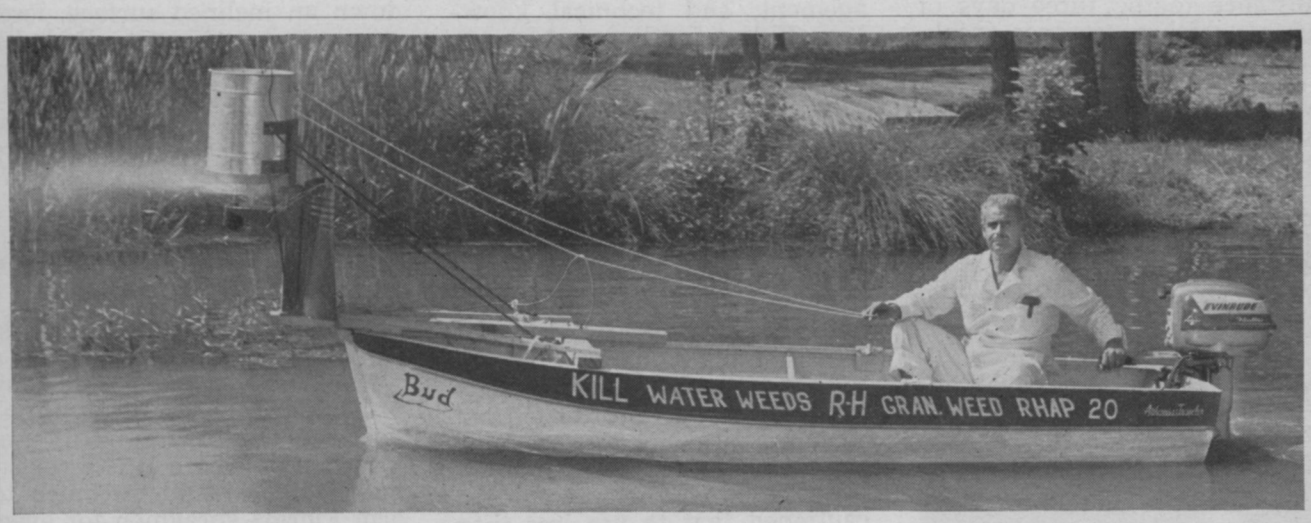
Timmons, F. L., V. F. Bruns, W. O. Lee, R. R. Yeo, J. M. Hodgson, L. W. Weldon, and R. D. Comes, 1963, Studies on the Control of Cattail in Drainage Channels and Ditches, Technical Bulletin No. 1286, U. S. Dept. of Agr. in cooperation with U. S. Dept. of Interior, Washington, D. C., 51 pp.

Weldon, L. W. and R. D. Blackburn, 1962, Identification of Some Common Aquatic Weeds, Hyacinth Control Journal, Vol. 1, August, pp. 32-37.

Southern Weedmen Gather Jan. 15-17 in Jackson

Nearly 500 weed control personnel from all phases of the industry will gather in the Heidelberg Hotel, Jackson, Miss., Jan. 15-17 for a varied program for weed controllers in industry, public works, and agriculture.

Dr. E. G. Rodgers of the University of Florida, Gainesville, is in charge of the program, and will furnish more information to those who desire it.



CYCLONE MODEL 20 HAND SPREADER. For fast, precision spreading of pelleted and granular chemicals; also seed. Galvanized hopper holds 3 gals. or approx. 20 lbs. Covers a 6- to 8-foot swath with most materials. Feathered-edge spread prevents streaks and double overlaps. Shield protects operator.

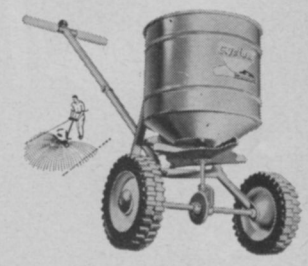
Cyclone

MODELS FOR LAND AND WATER FOR HERBICIDES, FERTILIZERS, SEED

The Cyclone Electric Model shown on boat, above, also mounts on garden tractor or front or rear of large tractor, truck or jeep. Powered by a self-contained electric motor which operates from the electric system of the vehicle upon which it is mounted. Models also available which operate from heavy duty, flexible drive shaft which fits tractor PTO. Double agitator, easy setting rate gauge, and positive shut-off. Spreads up to a 30-foot swath, depending on material being spread. 1-, 2½-, 3- and 5-bushel sizes. Time and money savers that can put many extra dollars in your pocket.

See your distributor or write for further information

THE CYCLONE SEEDER CO., INC.
Urbana 36, Indiana



CYCLONE LAWN SPREADER. Famous for speed, freedom from streaks, accuracy. Ideal for fast, precision spreading of pelleted and granular fertilizers, herbicides, insecticides, seed, ice melters, etc. Covers a 6- to 8-foot swath. Feathered edge spread to prevent streaks and double overlaps.

No one fretted about Rachel Carson.

Not a single speaker alluded to "the current furor over pesticides which is raging in our nation's capital."

In fact, for the 120 spray company executives who converged at the Robert Meyer Motor Hotel in Orlando, Oct. 31-Nov. 2, for the Fourth Annual Horticultural Spraymen's Association of Florida Convention, it was no time to be glum nor to look backward.

This was a meeting of professional businessmen, and they meant business from the very start.

Diverse as the program was,

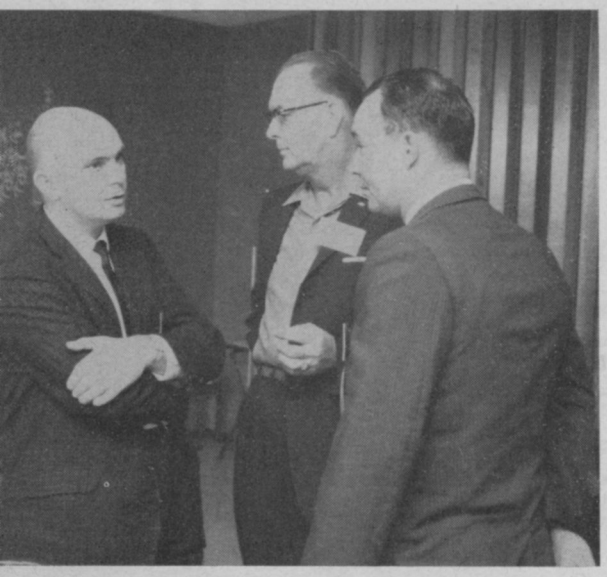
Panel of pros is always a highlight of HSAF conventions. Here, Charles Butterworth of Chase and Co. explains a fertilization technique while Ralph White of Ousley Sod Co. (left) and Dr. T. E. Freeman of the Florida Agricultural Experiment Station, listen closely.

Antipesticide Atmosphere Won't Stop Progress For Florida Spraymen, HSAF '63 Convention Implies

it seemed so logically organized that it gathered momentum with each succeeding address, finally culminating Saturday in a full-fledged equipment demonstration which gave solid bedrock substance to the three days of theory which conference speakers had presented.

A high note of practicality coupled with profound technical competence was sounded on the first day by entomologist Frank Wilson of the Florida State Board of Health in Jacksonville. Always popular with applicator groups, Wilson had some clear-cut observations to make on the business side of the spray business in the Sunshine State.

Popular entomologist Frank Wilson (left) chatted with spraymen Bob Short (center) and Hugh Sherouse, outside the meeting rooms.



Admonishing his audience to remember that spraymen's business structure consists of the interlocking facets of sales, management, and technical know-how, Wilson implied it is far too easy to overemphasize the technical at the expense of sales and management.

This was a welcome observation for the group which had already tacitly agreed to stop making such a fuss over antipesticide sentiment and to get on with the problems at hand, namely, more efficient and profitable business management.

Wilson did not confine himself to business observations, however, as he went on to spell out some practical tips for spraymen to use on the job.

For example, the entomologist cautioned that to use less than the recommended amount of water in a spray preparation may result in a partial dose of pesticide and increased deposits on leaves. This is because inadequate water prevents chemical from being carried down into zones where chemicals are most effective.

Wilson also told the assembly to watch out for incorrect pressure and rate of spray. Sometimes the output at the pump varies greatly from the output at the nozzle. Why?

One reason is friction loss, in which fluid passing from the pump through hose (which may be rough inside, crooked, bent, or otherwise hampering) loses some of the force which initially propelled it, in much the same way a droplet of water, rolling down an inclined surface, loses momentum and eventually halts.

To avoid this hazard, Wilson suggested the group calibrate its spray rigs, and alluded to material he published in *Weeds and Turf* for January, 1963 (page W-12).

Quartet of Common Turf Enemies Studied in Detail by 4 Experts

Nematodes, lawn insects, diseases and weeds constitute a formidable opposition for any professional turf management operator. But the fund of use-information which HSAF speakers offered should do much to arm Florida spraymen for ever-increasing success in the combat to preserve fine turf.

First in the series of addresses on these common turf ills was presented by Dr. A. A. DiEdwardo, who is Assistant Nematologist at the Florida Agricultural Experiment Station, University of Florida, Gainesville.

DiEdwardo, whose face is familiar to the spraymen of the state, had interesting information about some new compounds for defeating the nematode.

In a series of three tests with several materials, Dr. DiEdwardo was able to establish that at least three compounds look

promising for control of nematodes in turf.

"Based on nematode counts, and visual appearance of the grass in each of the three tests, the following materials gave excellent results within six weeks: Bayer 25141 (at 80 and 160 lbs./acre); Diazinon A-1619 (15 gal./acre); and DBCP (86.5 lbs./acre)."

Dr. DiEdwardo went on to explain that these are experimental materials and are not immediately available. But they're effective tools which applicators can look forward to using soon.

Insects A to Z

Second in the line-up of thorns in turfmen's sides are the lawn insects, which were discussed at length by Dr. James E. Brogdon, Extension Entomologist at the Experiment Station in Gainesville.

Dr. Brogdon explained that his paper was "Lawn Insects A to Z—Except C," the "C" in this case standing for the chinch bug, which received an entire address of its own from Florida expert Dr. Stratton Kerr.

Caterpillars remain a problem for spraymen, Dr. Brogdon said, especially the sod webworm and the fall armyworm. Best control, he revealed, is achieved with Sevin or toxaphene. Sevin is applied at 1½ lbs. of 80% sprayable per 100 gallons of water for 10,000 sq. ft.

Toxaphene is applied at 3 lbs. of 40% wettable powder or 1½ pints of 60-65% emulsifiable concentrate per 100 gallons of water for 10,000 sq. ft.

Continuing his bevy of helpful advice, Dr. Brogdon suggested that rhodesgrass and Bermudagrass scales could be reduced so that grass does not show injury by applying a series of two or three sprays containing a mixture of malathion and summer oil emulsion. Also, Cygon Dimethoate from American Cyanamid might be helpful, since this compound is a systemic.

Mole crickets are also troublesome in the peninsular state. Aldrin, chlordane, and heptachlor are commonly used with good results, Dr. Brogdon went on. "Kepone is a newer material which has given good control of mole crickets at 4-5 lbs. active ingredient per acre. This is 1¼ lbs. of 50% Kepone wettable powder per 100 gallons of water, applied to 5,000 sq. ft."

From lab and field, experts like Dr. Evert Burt (left), a weed control researcher, and Henry Swanson, Orange County Agent, assembled a fine program for HSAF members.

For billbugs, the scientist recommended VC-13, the insecticide-nematocide from Virginia-Carolina Chemical Corp. Trithion has also proved effective.

What Ails The Turf?

A close look at turf diseases, and the methods of control, was offered by Dr. T. E. Freeman, who is associate plant pathologist at the Florida Agricultural Experiment Station in Gainesville.

The turf authority said there are 100 diseases which affect grasses in Florida. Worst times for outbreaks are the mild, humid periods when it rains frequently.

Foremost in the fungus-incited afflictions which weaken stands of turfgrasses in Florida is brown patch, Dr. Freeman said. This is caused by a fungus known as Rhizoctonia. For control, use preparations which contain thiram, PCNB, organic mercury, Cyclohexamide, etc.

Fighting Lawn Weeds

A basic lesson in weed control was presented by Dr. E. O. Burt, assistant turf technologist at the Plantation Field Laboratory in Ft. Lauderdale.

He said one of the best ways to have weed-free turf is to fumigate the soil before planting. This can be accomplished with methyl bromide or DMTT, available commercially in such products as Mylone and Mico-Fume.

Dr. Burt has done some experimental work with a variety of preemergence and postemergence herbicides, and found time to detail some of his discoveries for the rapt gathering.

Among the compounds found effective on undesirable grasses found in warm-season turfgrasses, were Bandane, Betasan, Dacthal, and Zytron. Against broadleaved weeds in turf, Dr. Burt found Treflan (trifluralin) effective.

For postemergence control of annual grasses in Bermuda and zoysia, DSMA has been found valuable.

"Atrazine does a good job of controlling established broadleaved weeds when used as a postemergence herbicide," Dr. Burt advised, "but control of creeping beggarweed is not successful even with this common herbicide."

Among the nonselective herbicides for control of all vegetation, Dr. Burt singled out for comment both cacodylic acid and Diquat, the compound from California Chemical Co.

Cacodylic acid has no residual and is useful when one wishes to knock down all growth in order to reseed the next day.

Diquat is also nonselective, with no residual, but it, as opposed to cacodylic acid, is translocated, which means roots are killed and therefore sometimes a greater degree of kill is achieved.

"This Diquat is going to be a real good tool for us, I think," Dr. Burt concluded.

The Famous Chinch Bug

Study and discussion of the Florida lawn chinch bug was accorded an entire session separate from the time spent on examination of lawn insects in general.

From the Florida Agricultural Experiment Station came entomologist Dr. Stratton Kerr, a well-known man among Florida spraymen, who has devoted

Leader of the spraymen's group in 1964 is Ted Kaplan, new HSAF president.

years to chinch bug investigations.

Prior to listing his latest recommendations for control of the lawn chinch bugs, Dr. Kerr made several observations on the biology and behavior of the persistent pest.

Apparently high moisture content in lawns helps hold back chinch bug development, and of course rain helps decrease the chinch bug population. Also, there is usually not as much chinch bug damage in shaded areas as in sunny ones.

Among the newer insecticides, some as yet in the experimental stages, Dr. Kerr is particularly impressed with Bayer 39007, a carbamate from Chemagro Corporation which gives "excellent long-term control of the chinch bug" and which cleans up other pest species as well.

"This should be quite a contribution to our arsenal," Dr. Kerr said.

Another promising material is Dow's Zytron, a crabgrass killer which now looks good for chinch bugs as well. Dr. Kerr used it at 10 lbs. active per acre with good results. Dow plans to register it for use at 7 to 10 lbs. active per acre.

Renovate for More Profits

"One of the biggest problems in turf maintenance is removal of thatch," according to William E. Colburn, superintendent of the Bay Hill Golf Course in Windermere, Fla.

"Lawn renovation could be a profitable sideline for horticultural spraymen," the golf man continued. Machines such as aerators and verticutters, which are too expensive for the homeowner to buy and maintain, and usually too complicated for the amateur to rent and employ on the weekend, can be purchased and pressed into profitable service by professional lawn maintenance companies.

Renovation of any kind should be accomplished in the late spring or summer, Colburn pointed out. The process is best used when temperatures are not apt to drop to the low 60's or high 50's, because then it takes the grass too long to recover from mechanical renovation procedures.

A good application of fertilizer and frequent watering should follow verticutting, Colburn elaborated. In fact, a complete renovation should consist of verticutting, scalping, aerating, removing debris, and fertilizing.

"This is more beneficial than just verticutting, because by aerating, one improves the ability of the grass to absorb water and nutrients by allowing oxygen to enter the soil."

Update on turf diseases control came from Dr. T. E. Freeman from the Fla. Ag. Experiment Station.

Two Views on Fertilization

Since most HSAF members include custom fertilization among their lawn services, two addresses on turf nutrition struck a responsive chord among the assembled operators.

First was a basic summary of turf fertilization principles which was presented by Dr. G. C. Horn, a turf technologist from the Florida Experiment Station in Gainesville.

Dr. Horn reminded his audience that an increase in inorganic nitrogen seems to be accompanied by an increase in chinch bug activity, which bore out a statement made earlier in the program to the effect that fertilization can have profound effects on insect activity.

It is difficult for even the highly trained eye to tell at a glance what element is missing in turfgrass diets, and therefore recommend the proper corrective treatment.

Absence of such elements as nitrogen, potassium, and magnesium produce symptoms which may resemble each other. Chlorosis, the yellowing of leaves brought on by a lack of iron, is one such symptom.

"We do know," Dr. Horn posed, "that when we increase the increment of potassium on centipede grass, we increase the increment of chlorosis." This is something to watch out for.

Insects A to Z—except C (chinch bugs) was Dr. James Brogdon's slide-illustrated address.

"Geigy's 330 Chelate seems very effective in combatting chlorotic conditions," Dr. Horn summarized. He also recommends operators use the Cyclone-type spreader to apply fertilizers in granular form.

Near the end of each year's convention, planners of HSAF meetings summon to the roster all speakers who have appeared, and then subject the forum to a bombardment of questions from fact-hungry delegates.

This is called the "panel of pros" and has always been extremely popular. The '63 convention was no exception.

—Bill Reimer, who's with Woodbury Chemical Co. in Miami, asked Dr. Burt to compare the triazines to 2,4-D for weed control in St. Augustine grass.

—Dr. Burt replied that the triazines are not as hazardous as 2,4-D, although injury could result. "Grass should be in good shape before *any* herbicide is used," the weed authority warned.

—A delegate wanted to know what's good to control the Bermudagrass mite. He was told to use Diazinon, Ethion, or Trithion at the same rate which is recommended for chinch bugs.

—Is a fungicide more effective if applied alone rather than mixed with another chemical? Not necessarily, said Dr. Freeman, unless, of course, the two aren't compatible.

—Give us some tips on the use of sulfur. "When you use it, be

Plan to attend the

18th Annual Northeastern Weed Control Conference

JAN. 8-10 HOTEL ASTOR

NEW YORK, N. Y.

Sessions on turf, aquatic weed control, brush control, new chemicals, horticultural and agronomic crops, and general industrial and agricultural weed control technology.

For details write:

Dr. John A. Meade, Secretary-Treasurer, Northeastern Weed Control Conference, Department of Agronomy, University of Maryland, College Park

Another

Weeds and Turf

Reader Service

CLASSIFIED ADS

As an added service to our readers, classified advertisements will be accepted for publication beginning with the January issue. ■ Categories include Position Wanted, Help Wanted, For Sale, and Wanted to Buy. All copy subject to approval by our editorial and advertising departments. ■ The small charges for these ads are meant only to cover expenses, since the advertising is an aid to readers who wish to resolve individual business problems and projects. ■ Ads for January will be accepted through Dec. 15th. Thereafter, all copy must be received by the 5th of month preceding. ■ Rates: "Position Wanted" 5¢ per word, all other classifications, 10¢ per word. Minimum charge $2. ■ Address Classified Department, Weeds and Turf magazine, 1900 Euclid Ave., Cleveland, Ohio 44115.

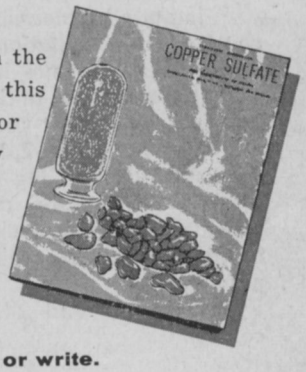
TENNESSEE CORPORATION

For control of algae, microorganisms and fungi.

READILY AVAILABLE IN ALL CRYSTAL SIZES

- **Large Crystals**
- **Medium Crystals**
- **Granular Crystals**
- **Snow Crystals**
- **Powdered** –instant dissolving

For your free booklet on the use of Copper Sulfate in this application, a quotation or the name of your nearby distributor, contact



Call us at JA. 3-5024 or write.

TENNESSEE CORPORATION

521 Grant Building, Atlanta 3, Georgia

Know Your Species

WATERMILFOIL

(Myriophyllum spp.)

Watermilfoil is the common name for about 20 species of the aquatic plant genus *Myriophyllum,* which means "many leaves." Most common species of watermilfoil are native to the United States and are not generally pests. Worst are those which have been imported from South America, parrotfeather, *M. brasilense,* and Asia, eurasian watermilfoil, *M. spicatum.*

Leaves of various watermilfoils range from finely divided feathery leaves along most of a plant stem to scalelike leaves (bracts) near the top. Leaves may be arranged circularly in whorls about the stem or may be placed alternately on the stem, depending upon the species. Bases of leaf parts generally encircle the stem.

All major leaf parts resemble feathers enough so that it can be said that this characteristic can be used to identfy a watermilfoil. For exact species identification, flowers and seeds found in the axils (juncture of leaf and stem) of the scalelike leaves are needed.

Flowers are small and inconspicuous. During flowering, tips of watermilfoil stems extend above the water surface. Stem tips may take on a reddish or pinkish cast; in other species stem tips are typically greenish.

Stems of watermilfoil usually remain under water. Roots extend from the stems to mud where they attach weakly. After watermilfoil matures, wave action may break the root connections and the submersed plants may pile up on the windward side of a lake.

Imported watermilfoils are serious pests on both east and west coasts; local infestations of other species occur across the nation.

Sodium arsenite introduced into water at 4 parts per million will kill watermilfoil and other weed species. This chemical should be handled with great care.

Spraying with 2,4-D is usually unsuccessful because the stem does not transport the chemical downward to any extent. Granular applications of 2,4-D at higher concentrations have been successful provided that the granules can penetrate the dense submersed growth. In this way, 2,4-D is absorbed by roots and carried throughout the plants.

Endothall and silvex have also been useful in watermilfoil control.

Prepared in cooperation with Crops Research Division, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland.
Drawing courtesy of the Regents of the University of Wisconsin, from N. C. Fassett, A Manual of Aquatic Plants, 1960, the University of Wisconsin Press.

sure you water it in well," said Ralph White. Furthermore, he mused, when you aren't sure of the effects of the chemical you're using, start to apply it at a very low rate, then work up until you get desired effects. "After all, once you put it on, you can't take it off," the turf grower said pointedly.

The crossfire of questions and answers was a lively conclusion to the 1963 convention of the Horticultural Spraymen's Association of Florida, which has vowed to make even more dramatic progress in the coming year, both in service to its members and in more help for the public.

To carry out this momentous task, delegates selected as their new president Ted Kaplan, who runs King Spray Service in Miami. The three regional vice presidents who'll assist are: (southern region) Hugh Sherouse of Hugh's Power Spraying, Pompano Beach; (central region) D. E. VanVolkenburg of Lawns, Inc. in St. Petersburg; and (northern region) William King, King Landscaping, Orlando.

NWCC Moves to Hotel Astor For 1964's Varied Program

Breaking with the traditional meeting place, the Northeastern Weed Control Conference will convene next year at the Hotel Astor in New York City for its 18th annual session.

In a diverse program Jan. 8-10, delegates will hear technical papers on herbicide-soil interactions, surfactants, pesticide uses, highway weed control, and, as usual, the new chemical report.

General program categories include Agronomic Crops, Horticultural Crops, Turf, Aquatics, Conservation and Forestry, Utilities, and Public Health.

Nearly 700 weed controllers from field, laboratory, and industry are expected to attend. A $6 registration fee includes admission to all sessions and a copy of the proceedings.

For details, write Dr. John A. Meade, Secretary-Treasurer, Northeastern Weed Control Conference, Dept. of Agronomy, University of Maryland, College Park.

For use in large turf areas, Royer Machine & Foundry is offering the Superintendent, a soil shredder for heavy duty use.

Royer Has New Soil Shredder

A new shredder-blender for turf supervisors and contractors has been announced by the Royer Foundry & Machine Company, Kingston, Pa.

Increased use of front-end loader tractors on golf courses, parks, and other turf installations, encouraged Royer to produce this model to replace the many hand-shovel-fed shredders now available, spokesmen said.

Called the "Superintendent" Model, the new machine is described as a low-cost, portable shredder that combines automatic trash removal, a receiving hopper for loading with small, tractor buckets, and a high discharge for truckloading or stockpiling.

Only 12 feet long and 6 feet high, the Superintendent is said to be a highly mobile, complete processing plant that provides improved blending of top dressing mixtures as well as fast, mechanical loading for building tees, greens, and other turf areas.

More information about the Superintendent is available from Royer at 158 Pringle St., Kingston, Pa.

Beginning Next Month

WEEDS and TURF

will come to you in a
More Convenient Size

Type area will remain the same, only the page size will be slightly reduced to 8¼" x 11¼" deep in keeping with the trend to these more popular dimensions. This will enable you to keep and file copies on your shelves more conveniently.

See Record Crowds for 35th International Turf-Grass Conference Feb. 9-14

"Bigger than ever" is the prediction for the 35th International Turf-Grass Conference and Show which convenes at the Sheraton Hotel in Philadelphia, Pa., Feb. 9-14.

Sponsored by the Golf Course Superintendents of America, this annual event and its accompanying trade exhibit have come to be called "the greatest show on turf."

During educational sessions this year, delegates will hear detailed addresses on both turfgrass fertilization and control of turf pests. In the latter series, authorities will examine aquatic weed control, effect of weather on insect damage, grass wilt, and spring deadspot. A lecture on winter damage problems is also in the offing.

Those interested only in the educational sessions and not in general golf subjects may attend by paying the normal registration fee, according to Dr. Gene Nutter, GCSAA Executive Director. More information is available from Dr. Nutter at P.O. Box 1385, Jacksonville Beach, Fla.

Meeting Dates

Northeastern Weed Control 18th Annual Conference, Hotel Astor, New York, N.Y., Jan. 8-10.

National Arborists' Association Winter Meeting, Galt Ocean Mile Hotel, Fort Lauderdale, Fla., Jan. 12-14.

Southern Weed Conference, Heidelburg Hotel, Jackson, Miss., Jan. 15-17.

16th Annual California Weed Conference, El Rancho Hotel, Sacramento, Jan. 21-23.

35th International Turf-Grass Conference and Show, Sheraton Hotel, Philadelphia, Pa., Feb. 9-14.

Weed Society of America Biennial Meeting, Pick Congress Hotel, Chicago, Ill., Feb. 10-13.

Aquatic Weed Control Society Annual Meeting, Palmer House Hotel, Chicago, Ill., Feb. 11-12.

Southern Turfgrass Conference, Peabody Hotel, Memphis, Tenn., Feb. 24-25.

Cornell Turfgrass Conference, Cornell Univ., Ithaca, N. Y., Feb. 24-27.

Midwest Regional Turf Conference, Purdue Univ., Lafayette, Ind., March 2-4.

Iowa State Univ. Turfgrass Conference, Iowa State Univ., Ames, March 10-12.

34th Annual Michigan Turfgrass Conference, Michigan State Univ., East Lansing, March 12-13.

Winter Turf School at Rutgers Starts Jan. 6

A course open to those who wish to make a career of turfgrass maintenance, and who have experience in the field, is being offered in two 10-week sessions by the College of Agriculture, Rutgers University, New Brunswick, N.J.

Subject matter includes lawn and utility turf maintenance, golf and fine turf culture, control of weeds, and turfgrass establishment.

More information is available from Westervelt Griffen, Assistant Dean of the College of Agriculture at the above address.

Business Tips Featured at NAA Winter Meet Jan. 12-14

Stressing business management and public relations, a varied program is the keynote attraction for delegates to the National Arborists' Association Winter Meeting in Ft. Lauderdale, Fla., Jan. 12-14.

Assembled at the Galt Ocean Mile Hotel, about 150 professional arborists are expected to join in discussions of insect and disease pests of trees and ornamentals during the annual affair.

An informal mixer is set for Sunday, Jan. 12, and official registration opens the following morning.

Each year the group also holds a summer meeting which includes a trade show, but no formal exhibits are planned for the January affair.

More details of the program will be available shortly, and will be reported here next month.

More information is available from Dr. Paul E. Tilford, NAA Executive Secretary, Box 426, Wooster, Ohio.

VICHEM FUNGICIDES & HERBICIDES

for treatment and maintenance of fine turf

These specialty products, developed specifically for golf course and park use, are now available for the treatment and control of fine turf grasses. VICHEM research in agricultural chemicals has produced such outstanding developments as DSMA—DiSodium Methyl Arsonate; AMA—Ammonium Methyl Arsonate; CPA—Calcium Propyl Arsonate; CALAR— Calcium Acid Methyl Arsonate.

. . . the finest chemicals to protect your finest turf.

FUNGICIDES

LIQUIPHENE 10% & 33⅓% (PMA)
THIURAM 75 (Thiram 75%)
VI-CAD (Cadmium Chloride)
THIURAM M (Thiram-Mercury)

HERBICIDES

• for Crabgrass and weed control
CRAB-E-RAD (Powder) DSMA
SUPER CRAB-E-RAD (Liquid) AMA
SUPER CRAB-E-RAD + 2 (Liquid) AMA + 2,4,D
SUPER CRAB-E-RAD (Calar)
CRAB-E-RAD 30 (Liquid) DSMA

• for Dallis grass control
DAL-E-RAD 100 (Powder) DSMA
SUPER DAL-E-RAD (Liquid) AMA
SUPER DAL-E-RAD + 2 (Liquid) AMA + 2,4,D
DAL-E-RAD 30 (Liquid) DSMA

Distributor Inquiries Invited

VICHEM
VINELAND, NEW JERSEY

VINELAND CHEMICAL SALES CORPORATION
Manufacturing Plants: Vineland, New Jersey • Palmer, Puerto Rico

Trimmings

Barging on the shoals. We just had a note from E. Victor Scholl, who runs Modern Weed Control Service in Grand Rapids, Mich., about the series of articles on aquatic weed control which terminates in this issue. Vic is a well-known applicator in aquatic work, and has designed a really first-rate barge for use in such jobs. We've commented before about the ingenuity of spraymen who've had to construct their own specialized equipment for this field, and Vic's barge is a sight to behold. Later next year we'll have more details about this Michigander's efforts to defeat waterweeds in his "water wonderland" state.

* * * *

Ivy-less League. *Did you know that aquatic plants can "ac-crew" so much that they wreak havoc with the rowing teams of some ivy league schools? We just learned that Lake Carnegie, the Princeton, N.J., lake where the Tiger Crew holds its sailing and boating competition, was getting so overrun with plants that the collegiates were really getting bogged down. Then to the rescue came Consulting Biologists, Inc., of Springhouse, Pa., which used a helicopter and an aquatic herbicide to give the ivy leaguers a better place to paddle. Pilot was Charles P. Logg, and last reports have it that there's smooth sailing in Princeton today!*

* * * *

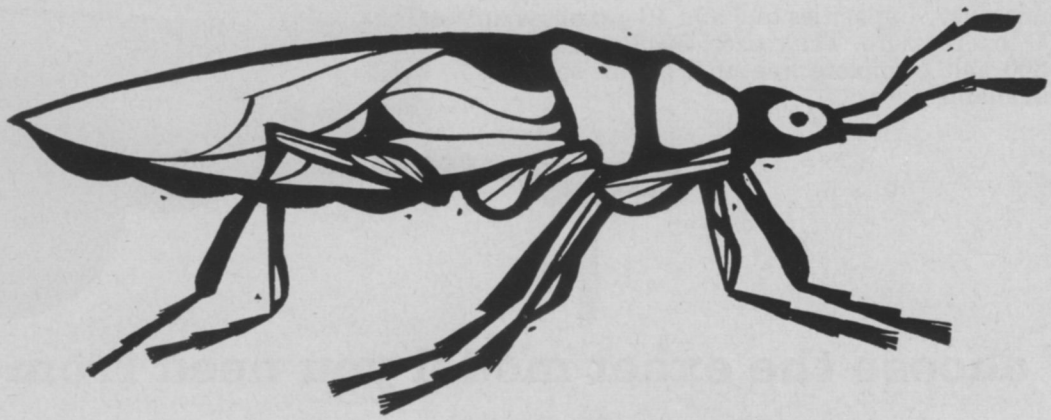
Of mice and fen. Out in Washington, we hear, the fens and bogs (and tree-covered hills) are being plagued with mice and rabbit population explosions after each timber harvest. When smaller plants, their bigger competition removed, begin to flourish, so does the fauna. This is a problem because the husky predators soon begin to feed on freshly planted seeds. This vicious circle is presently "bugging" our Washington friends more than over-zealous conservationists!

* * * *

Two-way street. *While we are feeling confident about the efficacy and usefulness of our chemical herbicides, it's a sobering fact to realize these materials (or similar ones, at least) are being used on the "other side." We recently saw a photograph of an East German workman sprinkling weedkillers along the barbed-wire fence which abuts the Berlin wall. Getting rid of the weeds, it seems, helps give the Communist guards a better view of disgruntled countrymen who have their minds on escape*

* * * *

Lady sprayman. We'll wager that one of the best looking applicators in the whole state of Florida is one Patricia A. M. Bay, who runs Pat's Spray Service in Winter Haven. Pat is a winsome gal who was on hand for the Horticultural Spraymen's Association of Florida Convention last month in Orlando. This busy lass didn't miss a session during the three-day conclave, busily note-taking all the while!



Here today...

...goner tomorrow

Ethion kills chinch bugs . . . ends destruction to lawns, parks and fairways. Ounce-for-ounce no pesticide outperforms it. Tests show just one application gives outstanding results and provides total control. And Ethion is easy-to-use, safe, economical, long lasting. U.S.D.A.-approved to curb sod webworms, halt mites in Bermuda grass, too. Write or call your supplier today for details.

fmc

TECHNICAL CHEMICALS DEPT., NIAGARA CHEMICALS DIVISION, MIDDLEPORT, NEW YORK

custom applicators!

FAMOUS ROYALETTE SERIES

Economy plus all-around versatility and complete dependability. Capacities of 5 and 10 g.p.m. at up to 400 lbs. pressure. Tank sizes: 50, 100, 150, 200 and 300 gal. Complete line of 3 g.p.m. sprayers also available.

choose the exact model you need from

3 John BEAN SPRAYER SERIES

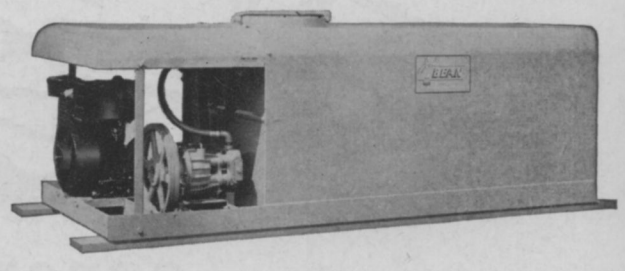
Now, John Bean offers the CA the widest selection of high pressure sprayers available with 3 complete series to choose from! Pump capacity and pressure, tank size, mounting type and sprayer accessories are a matter of choice—you select the model that fits your business requirements exactly. And, every model features long, trouble-free service with exclusive Bean Bond corrosion-resistant tanks and Sapphite pump cylinders that are so hard they resist wear from the most corrosive spray materials. See your dealer for complete details.

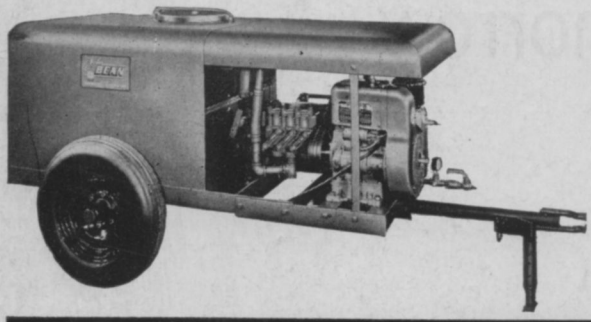
PROFITABLE PERFORMANCE FOR EVERY JOB:

- brush and weed control
- shade tree spraying
- liquid fertilizing
- mosquito and termite control
- sanitation spraying

NEW ROYALIER SERIES

Featuring the new 4-piston Royalier pump that combines compactness plus performance that's practically pulsation-free. Capacities: 15 g.p.m. at pressures up to 400 lbs. and 20 g.p.m. up to 300 lbs. pressure. Tanks available in 200, 300, 400 and 500 gal. sizes.





RUGGED ROYAL SERIES

For big capacity spraying. Three capacities to choose from: 25 g.p.m. at up to 700 lbs. pressure; 35 and 60 g.p.m. at pressures up to 800 lbs. Tank sizes from 200 to 1000 gal.

FOR EXTRA PROFITS, SELL John BEAN SPRAYERS —WRITE TODAY FOR FRANCHISE DETAILS

for special dutch elm disease and mosquito control data, plus free catalogs—check, clip and mail coupon attached to your card or letterhead

fmc CORPORATION

JOHN BEAN DIVISION

Lansing, Mich. – Orlando, Fla. – San Jose, Calif.

Send me:

- ☐ Royal, Royalier and Royalette Catalogs
- ☐ Facts on Dutch Elm Disease
- ☐ Rotomist Sprayer Catalog
- ☐ Facts on Mosquito Control